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METHYL ALCOHOL—WHAT IS IT AND WHAT IS IT GOOD FOR?

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When wood, especially hard wood, such as oak, hickory and beech, is heated in closed retorts to which oxygen does not have access, many products result. The volatile products are distilled and consist of wood tar, creosote, carbolic acid, acetic acid, acetone and methyl alcohol, all of which are solid or liquid bodies at ordinary temperature.

There are various gaseous products of distillation also produced, many of which are combustible. The mixed watery distillate which comes over is known as pyroligneous acid. It consists of water, acetic acid, methyl alcohol, acetone, etc. The first fraction obtained by distilling the crude pyroligneous acid is sometimes known as wood spirit, and with more or less purification is used largely as a denaturing agent for ordinary ethyl alcohol. The taste and odor of this product are so disagreeable as to prevent the utilization of the ethyl alcohol with which it is mixed for potable purposes. Methyl alcohol in a greater or less degree of purity can be secured from this mixture by diluting with water, which throws out some of the other liquid products which are then separated, and the residual alcohol is then redistilled over lime in a chambered or rectifying still. The spirit thus removed is filtered through charcoal to complete the rectification. Where a very concentrated methyl alcohol is to be secured, several redistillations are necessary. Acetone, although it has a lower boiling point than methyl alcohol, cannot be completely separated from the latter even by repeated distillation over lime.

In order to separate the acetone completely the mixture is treated with chloride of lime, whereby the acetone is converted into chloroform.

The chief gaseous products of distillation are hydrogen, methane, ethane, ethylene, carbon monoxide and carbon dioxide. Methyl alcohol has been said to occur in traces in the juice of some plants, and methyl salicylate is a well-known natural product commonly called oil of wintergreen. Pure methyl alcohol has a specific gravity at zero of 0.810 and boils at 66° C.

Owing to its having almost the same density as ethyl alcohol it is useless to try to distinguish between these two bodies or one of them in a mixture with the other by specific gravity alone. Although ethyl alcohol boils at 12° higher than methyl, it is very difficult to completely separate them by fractional distillation. Many of the methods of detecting methyl alcohol in mixtures, qualitatively, and of estimating it quantitatively, are very unsatisfactory and to a certain extent unreliable. There are one or two methods, however, which are reasonably satisfactory and which are as follows:

A simple color reaction for methyl alcohol is described in the *American Chemical Journal*, Vol. xxi, 1899, p. 266. This test depends upon the oxidation of methyl alcohol to formaldehyde, and the detection of the presence of the latter compound by the reaction with resorcin and sulphuric acid. This is a test which can be easily applied, and therefore I will give it in sufficient detail for ordinary purposes.

It is best that the solution to be examined should be previously distilled, but this is not always necessary. A spiral copper wire is heated to a bright red heat and plunged into a small quantity of the mixed alcohols to be examined. It is well, if the solution is dilute, to repeat this process several times. If the alcohol is concentrated it should be diluted before the application of the test. One drop of $\frac{1}{2}$ per cent. aqueous solution of resorcin is added and the mixture carefully poured into a test tube containing a few cubic centimeters of concentrated sulphuric acid. The presence of methyl alcohol is indicated by the production of a rose-red zone at the conjunction of the two liquids. Above this zone a scanty white or pinkish coagulum appears which finally separates and rises in purplish-red flecks.

The only compounds which give any reactions similar to the above described are the tertiary butyl alcohols, dimethyl-ethyl car-

binol, and formic acid. The succession of colors and the deportment of the flaky coloring matter finally produced are quite different, however, with these bodies as compared with those given by methyl alcohol.

The test with phloroglucin is made as follows: The oxidation of the methyl alcohol is carried on as described above. Acetaldehyde is removed by adding to the liquid remaining in the test tube 6 c.c. of a 3 per cent. solution of hydrogen peroxide, or an equivalent amount of hydrogen peroxide if in a different strength of solution. Mix the contents of the tube and filter into a porcelain dish. After three minutes add 2 c.c. of a 10 per cent. solution of sodium thiosulphate. Next add 3 c.c. of a phloroglucin solution obtained by dissolving 1 gramme of phloroglucin and 20 grammes of sodium hydroxide in water and making the volume to 100 c.c. A bright red coloration indicates the presence of methyl alcohol in the original sample. The intensity of the red color is in some degree proportionate to the quantity of methyl alcohol originally present. When carefully conducted, 1 part of methyl alcohol in 20 parts of ethyl alcohol can be detected by this reaction.

The purest forms of wood spirits are known by trade names as Columbian or Manhattan spirits. When perfectly pure, methyl alcohol is not unpleasant either to the taste or the smell, and it is much less toxic than the crude product which is so often used in denaturing spirits. It is more than probable that many of the toxic effects which have been reported as due to the use of wood alcohol have been produced by the impure or unrectified article. In fact, the pure article is so greatly increased in cost that it is not likely that its use will become very common. At the same time it must not be forgotten that wood alcohol is not subject to any internal revenue tax nor any restrictions, in so far as I know, in manufacture or sale. For this reason its general distribution for almost any purpose would be facilitated. In view of the terrible indictment of methyl alcohol which has been summed up by Buller and Wood in the *Journal of the American Medical Association*, it seems only just to say that it is a substance which should be absolutely eliminated from any body or bodies which are taken internally or even applied externally as a remedy or otherwise.

Wood spirit undoubtedly has a large and legitimate use in the arts as a fuel and a solvent, and its manufacture and sale for such

purposes cannot be open to objection. It is true that any dangerous substance, even when manufactured solely for the arts, may be used in other ways to the great detriment or even death of the user. As a rule, however, in the case of wood alcohol the user himself is the culpable person, since he takes it ~~either~~ from an uncontrollable desire to drink or by accident which could be avoided by the exercise, on his part, of common discretion.

The addition of methyl alcohol, either pure or refined, to beverages or to medicine cannot be too severely condemned. I have spoken of the desirability of eliminating it from liquids applied externally, such as bay rum and others of the same class, and I think it is probable that the results of accident and experience are such as to warrant such exclusion.

All the alcohols are more or less poisonous, but the toxicity does not seem to be regularly connected with the place of the alcohol in the series. The two alcohols which are most common and occur in the greatest abundance are ethyl and methyl. Methyl is given the first place in the series, and ethyl the second. It is generally acknowledged that methyl alcohol is more toxic than ethyl, and yet the toxicity of ethyl alcohol is familiar to every one. Both methyl and ethyl alcohol appear to undergo, to a considerable extent, oxidation in the tissues of the body, but each of them before undergoing oxidation may pass into the circulation and produce toxic effects before nature has an opportunity to oxidize and remove it. Some of the higher alcohols are supposed to be more toxic than ethyl, just as methyl is supposed to be more toxic, but there is some doubt about the degree of toxicity of some of the higher alcohols, especially amyl alcohol. When quite pure it does not appear to have by any means the toxic properties which are exhibited by the crude article. All this leads to the belief that very often the toxicity of alcohols may be due to some aldehydic or other body formed with them, and from which it is difficult to separate them. In fact it is believed that the aldehydes which so generally accompany the alcohols and have such an intimate relation thereto are more toxic than their corresponding alcohols. This appears to be pre-eminently true in the case of methyl alcohol, for it is generally believed that formaldehyde is more toxic than the alcohol itself. The same is doubtless true of acetaldehyde, which is more toxic than ethyl alcohol.

For this reason the alcohols in the crude state, that is, as they are first formed and distilled, are more toxic than when they have been subjected to a process of purification. This point has already been brought out in the case of ethyl alcohol.

That well-known beverage, namely, whiskey, which consists largely of ethyl alcohol, is believed and in fact has been demonstrated to have far more toxicity when first distilled and when it probably has considerable quantities of aldehyde and furfurals and other bodies than it has after it has been stored in wood for several years and these compounds have had an opportunity to become oxidized into harmless and even beneficial ethereal compounds. The physician and pharmacist should not forget, however, that the alcohols as a rule are toxic, and doubtless some of them, like methyl alcohol, much more so than others, like ethyl alcohol. Their use, therefore, should be under careful supervision.

Whatever our opinion of the internal revenue laws may be, we must at least admit that in the careful supervision which they exercise over the manufacture of distilled spirits, they are highly beneficial from a hygienic point of view, since they give to the consumer accurate information relating to the materials used and the age of the product.

While it is not probable that the amount of money which could be raised by tax on the manufacture of wood alcohol would be a very considerable sum, it seems to me it would be the part of wisdom to lay a small tax on wood alcohol, both in its manufacture and subsequent sale, for the purpose of establishing over it the same legislative supervision which now attaches to the manufacture and sale of ethyl alcohol, and which supervision should extend, as it ought to extend in the case of ethyl alcohol, to all remedies and beverages made therefrom. It seems to me there can be no excuse for removing the restrictions in the trade from alcohol when anybody wants to use it and call it by a medical name. All medicines and remedies containing alcohol, which are not official, should be subjected to the same regulations in manufacture and sale as the corresponding quantity of alcohol sold as such.

The flooding of our country with various medicines in which alcohol constitutes the chief valuable constituent without control, without notification and without the knowledge of the consumer, is a practice that merits condemnation whether that alcohol be ethyl or

methyl. If it be methyl alcohol, the practice should receive an additional condemnation because of the greater toxicity of this compound.

THE ATTITUDE OF THE FRENCH GOVERNMENT TOWARDS METHYL ALCOHOL.

Article V, paragraph 1 of the law of the 16th of December, 1897, provides that there shall be considered from the fiscal point of view as assimilated to ethyl alcohol, methyl and other alcohols susceptible of being consumed as beverages either unmixed or mixed.

"The Consulting Committee of Arts and Manufacture shall determine which of these products by their degree of impurity or their specific characters should be considered as unfit for consumption, and to be exempt from excise or from denaturing.

In view of this authority the Consulting Committee of Arts and Manufactures, on the 14th of March, 1900, decided that, in order to be considered as unfit for consumption by the mouth, and free from the expense of excise and denaturing, methyl alcohols should contain at least 5 per cent. of acetone and 3 per cent. of pyrogenic impurities, which give to them a disagreeable empyreumatic odor. Under date of the 4th of January, 1905, the President of the Republic, through the Minister of Finance, Monsieur Rouvier, promulgated the following official decree:

Article I. The decision of the Consulting Committee of Arts and Manufactures of the day of the 14th of March, 1900, shall receive its full and entire execution.

Article II. The Minister of Finance is charged with the execution of the present decree, which will be inserted in the *Journal Officiel* and in the *Bulletin des Lois*.

THE DETECTION OF METHYL ALCOHOL IN LIQUIDS CONTAINING ETHYL ALCOHOL.

BY SAMUEL P. SADTLER, PH.D.

The increasing tendency to substitute methyl alcohol under some one of the trade names by which it is now known, for ethyl or grain alcohol, in the manufacture of tinctures, essences and other alcoholic preparations, makes the detection of such substitution or adultera-

tion a matter of importance both for the pharmaceutical chemist and the food analyst.

If we turn to standard books like "Allen's Commercial Organic Analysis" for the tests for methyl alcohol in the presence of ethyl alcohol we will find that the methods there found are far from being satisfactory in results or capable of entire dependence as to accuracy.

We find first several methods, such as those of Reynolds and of Cazeneuve, based upon the common presence of acetone as an impurity in methyl alcohol, so that its detection by inference leads the observer to draw conclusions as to the presence of methyl alcohol. This is a very unreliable and unsafe way of detecting the presence of methyl alcohol. Some of the deodorized and purified methyl alcohols on the market at present, like "Columbian Spirits," at times are nearly free from acetone, so that such methods can be dismissed from further consideration.

The method of Riche and Bardy, dependent on the formation of methyl iodide and from this methyl-aniline violet, is fairly reliable, but much too elaborate and involved to serve as a ready test. In this case the mixture of alcohols is distilled with iodine and red phosphorus when methyl and ethyl iodides are formed. These collect under the aqueous layer and are separated and transferred to a flask containing aniline with which they react readily. After an hour's time, the product is boiled with water and soda solution added when the bases rise to the top as an oily layer. This is drawn off and oxidized by the aid of cupric nitrate. The product of this oxidation, which takes some hours, is exhausted with warm alcohol and filtered when, if pure ethyl alcohol had been taken as the original sample, a red liquid is obtained, while if methyl alcohol had been present a violet shade is obtained. Still more conclusive results are obtained if the colored solution so obtained is used to dye a piece of white merino wool which takes up the violet color, but is not dyed in the absence of the methyl-aniline compound. This test is obviously too difficult of execution and too detailed to be available for ordinary pharmacopœial testing.

Still another test is given in Allen, viz., that of Miller. This is based on the fact that when oxidized with potassium dichromate and sulphuric acid, methyl alcohol produces formic acid, capable of reducing silver nitrate solution. However, pure ethyl alcohol when oxidized yields a trace of formic acid, or other reducing substance,

and so we cannot depend absolutely upon the result of the reducing test.

In 1899, Mulliken and Scudder published a method (*Am. Chem. Jour.*, 21, page 266), whereby a mixture of methyl and ethyl alcohol is oxidized in solution by the action of heated metallic copper, producing the corresponding aldehydes. Any formaldehyde so obtained is then recognized by characteristic color tests.

This method, in a somewhat modified and improved form, was brought out later by Dr. A. B. Prescott and by Leonard D. Haigh. (*Pharmaceutical Review* of October, 1903.)

In the form in which Dr. Prescott communicated it to the U. S. Pharmacopeia Revision Committee, it was as follows:

Test for Methyl Alcohol.—In a test-tube of the capacity of about 40 cm., take of the alcohol or spirit to be tested, if it be undiluted, 1 c.c. and add distilled water to make 10 c.c. in all. If the alcohol be judged to be already dilute take a correspondingly larger measure of it and dilute this to 10 c.c., so that the proportion of the alcohol shall not be more than 10 per cent. by volume in the liquid. A copper wire spiral (test reagent) is to be heated to redness in a flame free from soot, then plunged steadily quite to the bottom of the liquid in the test-tube and held there for a second or two, then withdrawn and dipped in water to cool. This treatment with red hot copper is to be repeated five or six times, immersing the test-tube in cold water to keep down the temperature of the liquid. The contents of the test-tube are now filtered into a wide test-tube and boiled very gently over the flame. If there be odor of acetaldehyde perceptible the boiling is to be continued until this odor nearly or quite ceases to be clearly distinguished. The liquid is now cooled, poured into a white porcelain dish with concave bottom, and lastly treated with the addition of five drops (or 1 c.c.) of phloroglucinol alkali solution (test reagent).

The color, if any, caused by the reagent should not be deeper than pale yellowish red, and should fade rapidly away.

(A deep red color persisting two or three minutes and longer, the reaction of formaldehyde, indicates methyl alcohol taken for the test. A pale or slight yellowish red color fading rapidly, the reaction of acetaldehyde, results when only ethyl alcohol is taken, the acetaldehyde produced by the treatment not being wholly driven off by the gentle boiling.)

Copper Wire Spiral.—Copper wire of size 18 is taken of the length of 1 meter. It is wound in a close spiral around a smooth rod 7 mm. thick to make a coil about 3 cm. long. A handle is made by twisting together the two free ends of the wire in the spiral, one of the ends having been overlapped in winding, beginning to wind at about 30 cm. from the end of the covered strand. The handle is left of sufficient length and is bent at right angles 6 cm. from the extremity, the horizontal part being wound with twine.

Phloroglucinol Test Solution.—Take of phloroglucinol 5 decigrammes; soda (white), 10 grammes; distilled water to make 50 c.c. Dissolve the phloroglucinol in about 40 c.c. of the distilled water with a little of the soda, then add the remainder of the soda, and enough distilled water to make the solution measure 50 c.c. A slight color in the fresh solution usually disappears on brief standing and may be disregarded. On long standing the solution darkens in color and should be rejected.

In Haigh's article the suggestion is also made that—

"The Rimini test may be used instead of the phloroglucinol test for the detection of formaldehyde after the oxidation of the alcohols. After the removal of the acetaldehyde by boiling, 1 c.c. of a dilute solution of phenylhydrazine hydrochloride is added, then a few drops of a fresh solution of sodium nitroprusside, and finally 1 c.c. of a 50 per cent. solution of sodium hydroxide. If formaldehyde is present a light blue or green color will result, depending upon the amount of methyl alcohol in the original spirit, and to some extent also on the care with which the boiling operation is conducted. The boiling of the liquid should not be carried too far and should be conducted as slowly as possible. In case the original spirit contained no methyl alcohol the resulting color of the solution will be a greenish yellow. Satisfactory results are obtained with both of these tests for quantities of methyl alcohol in spirits as small as one part to twenty parts of ethyl alcohol.

The Sub-committee of the U. S. Revision Committee then undertook a careful testing of this modified Mulliken and Scudder method and tested the several color reactions suggested to distinguish the formaldehyde. They found that the resorcinol test seemed more delicate than the phloroglucinol test and could be made to distinguish a smaller admixture of methyl alcohol than the other. In

addition the alkaline phloroglucinol test reagent does not keep as satisfactorily as the resorcinol solution, so that for the official test to be used in the forthcoming Pharmacopœia they have recommended the following. They believe that this can be carried out with uniform results by any careful experimenter, and it is relatively simple in its experimental details, as compared, for instance, with either the Riche and Bardy or even the Rimini test.

U. S. Pharmacopœia Methyl Alcohol Test.—Into a test-tube of about 40 c.c., 1 c.c. of the alcohol or spirit to be tested should be poured, and, if it be undiluted, enough distilled water added to make the liquid measure 10 c.c. If the alcohol be already diluted, a correspondingly larger volume of it should be taken and diluted to 10 c.c., so that the proportion of alcohol in the liquid shall not be more than about 10 per cent. by volume. A copper wire spiral (made by winding 1 meter of No. 18 clean copper wire closely around a glass rod 7 mm. thick, making a coil about 3 cm. long, the end of the wire being formed into a handle) should be heated to redness in a flame free from soot, and plunged steadily quite to the bottom of the liquid in the test-tube and held there for a second or two, then withdrawn and dipped into water to cool. This treatment with red-hot copper should be repeated five or six times, immersing the test-tube in cold water to keep down the temperature of the liquid. The contents of the test-tube should now be filtered into a wide test-tube and boiled very gently. If the odor of acetaldehyde be perceptible, the boiling is to be continued until the odor ceases to be distinguished clearly. The liquid is now cooled, and to it should be added 1 drop of a solution containing 1 part of resorcinol in 200 parts of water. A portion of this liquid is then poured cautiously into a second tube containing pure sulphuric acid, in such a way that the two liquids shall not mix, the tube being held in an inclined position; this tube is allowed to stand for three minutes, and then slowly rotated. No rose-red ring should show at the line of contact of the two layers (absence of more than 2 per cent. of methyl alcohol).

SOME REASONS WHY THE INTERNAL REVENUE TAX ON ALCOHOL SHOULD BE REDUCED, AND WHY OUR GOVERNMENT SHOULD PROVIDE FREE DENATUR- IZED ALCOHOL FOR USE IN THE ARTS.

BY MAHLON N. KLINE.

No legislation pending in Congress is more important or promises to be more far-reaching in its results than the proposed legislation affecting the duty on alcohol. The commercial world (and especially that part of it in which manufacturing chemists or pharmaceutical manufacturers, large and small, are embraced) has scarcely grasped the magnitude of the results that would follow the enactment into laws of the legislation proposed in the bills introduced by Hon. H. S. Boutell, of Illinois—H. R. 9302, providing for the use, free of tax, of alcohol which has been rendered unfit for drinking purposes by the admixture of some noxious substance, and H. R. 9303, reducing the internal revenue tax on distilled spirits, and H. R. 9051, introduced by the Hon. Wm. C. Lovering, of Massachusetts, providing for the refund of the tax paid on domestic alcohol used in the manufacture of exported articles. No other legislation now suggested in the public interest can be compared with these propositions in their effect in creating new industries, developing those already in existence and greatly increasing our domestic and foreign trade.

The necessity for the legislation proposed in the first of these bills is found in the fact that our internal revenue laws, under which a tax of \$1.10 per proof gallon is levied on all distilled spirit, make no distinction between the distilled spirits used as a beverage and that used for industrial purposes. In the latter form distilled spirits, generally called alcohol, are a necessary material in thousands of important industries. The use of alcohol for manufacturing purposes is much more extensive than is commonly supposed, since, in addition to the industries producing articles in which alcohol remains in the finished product, there are many articles in the manufacture of which alcohol is used, though they contain no trace of that material.

As commercial alcohol is usually of 188° or 190° proof (that is 94 or 95 per cent. pure alcohol) the tax of \$1.10 per proof gallon is equivalent to a tax of about \$2.07 per gallon of industrial alcohol,

or nearly 1,000 per cent. of the original cost of the alcohol as distilled. The effect of a tax of this kind on a material used in manufacturing many important articles of general consumption is so evidently oppressive on productive industry that practically every commercial and manufacturing country in the world, except the United States, makes a distinction between alcohol used for industrial purposes and that used as a beverage. In Germany, France, Great Britain, Austria, Russia, Holland, Denmark, Norway, Sweden, Switzerland and Italy, and several smaller countries, no tax is imposed on alcohol which has been rendered unfit for drinking purposes, or, as it is commonly called, "denaturized alcohol."

This policy of exempting industrial alcohol from taxation has been in force in these countries for varying periods, in some cases for more than twenty years, and in every case the advantages resulting from it have been found so great that the tendency everywhere has been to broaden the scope of the laws relating to this subject. In no instance has a country which has once adopted such a policy gone back to the old system of taxing alike beverage and industrial alcohol.

Notwithstanding the fact that the most important of these European countries have very costly military and naval establishments to sustain, which are a very heavy strain on their revenue resources, and which necessitate many special forms of taxation to which the American people would not submit, no suggestion is ever made of levying internal revenue taxes on alcohol used for industrial purposes.

The most notable example of the benefits conferred by freeing from taxation alcohol used in the arts and manufactures, is found in the experience of Germany. That country in 1887 enacted a law greatly extending the system of untaxed denaturized alcohol which had previously been in force, and encouraging the production and general use of alcohol for industrial purposes. The results of this more liberal policy have been of great benefit, both to the farming and manufacturing interests.

The German farmer has been benefited by cheap untaxed alcohol in two ways: (1) Through a great additional market for his potatoes, of which enormous crops are annually grown for making alcohol; and (2) through the use of alcohol for light, heating purposes and as a fuel for motor engines running all kinds of farm

machinery. The farmers have also benefited by this policy making possible the development of new industries employing many thousands of workmen, who consume large quantities of German farm products.

Germany's manufacturing industries in the many lines in which alcohol is used have been enormously stimulated by the very low price (the present cost, according to Consul-General Mason's report, being from 15 to 18 cents per gallon) at which it can be procured. With the advantage of a cheap and abundant supply of this important material the German manufacturers in these lines have developed their industries so that they are now the foremost in the world, and have secured almost the entire export trade to neutral markets.

Among these articles are the products of the great chemical industries, the coal-tar colors, lacquers, dyes, varnishes, perfumery, etc., etc. Not only does Germany practically control the trade of neutral markets in all the various chemical products, but she also sells large quantities of these articles in this country, the advantage resulting from cheap alcohol being sufficient to enable them to be sold here in spite of our protective tariff. The effect of our exorbitant internal revenue tax on alcohol has, therefore, been to encourage the sale in this country of foreign production, instead of domestic origin.

The effect of the German law of 1887 in stimulating the consumption of untaxed alcohol is shown by the following table:

Year Ending Oct. 1st.	Amount Proof Gallons.
1888	20,476,763
1889	22,786,987
1890	28,074,667
1891	27,426,341
1892	29,127,384
1893	32,052,803
1894	35,102,593
1895	37,977,396
1896	42,694,947
1897	45,818,132
1898	46,979,841
1899	52,290,000
1900	55,098,285
1901	61,053,000
1902	58,632,840

In addition to this enormous amount of untaxed alcohol, Germany

consumes for industrial purposes an almost equally large amount of tax-paid alcohol. Owing to the low tax-rate in force in that country (about 40 cents per proof gallon) the industries requiring pure ethyl alcohol have been so extensively developed that the estimated annual consumption of tax-paid alcohol is about 55,000,000 proof gallons annually. While no statistics giving the actual consumption of the tax-paid product for these purposes are obtainable, this estimate is reached by deducting from the total average amount on which taxes are paid an average annual consumption for beverage purposes equal to the proportionate consumption for this purpose in the United States. As it is well known the Germans are a beer- and wine-drinking people, it is highly improbable that they also drink as much distilled spirits as the people of this country, so that the estimate of the consumption in Germany for beverage purposes is probably too large. In any event there is shown to be a consumption of tax-paid alcohol in the arts of over 50,000,000 gallons per year, making, with the consumption of untaxed denaturized alcohol, an annual total of more than 100,000,000 gallons of alcohol.

In sharp contrast with this immense quantity is the consumption of alcohol in the United States. There is, of course, no consumption of untaxed denaturized alcohol, owing to the failure of our laws to make provision for such use. Of tax-paid alcohol it is estimated that less than 5,000,000 gallons are annually used in the arts, the excessive tax of \$2.07 making its use prohibitive, except where it is absolutely necessary in the manufacture of articles such as flavoring extracts, perfumery, pharmaceuticals, medicines, etc. Even in these industries the consumption is very much smaller than in Germany, as the high cost of the alcohol greatly increases the selling price of the goods into which it enters, and therefore decreases their sale.

Another reason for the small consumption of tax-paid alcohol is found in the general use of inferior untaxed substitutes, chiefly refined wood alcohol, which, notwithstanding its injurious qualities that render it dangerous to health, is being largely substituted for pure grain alcohol. The extent to which this substitution is carried on is notorious, and the health officials throughout the country are taking active measures to punish the manufacturers of preparations in which wood alcohol is unlawfully used.

In a paper on "Poisoning by Wood Alcohol," by Drs. Frank Buller and Casey A. Wood, recently published in the *Journal of the*

American Medical Association, attention is called to the increasing use of wood alcohol, particularly of the highly refined varieties, in the manufacture of Jamaica ginger, flavoring extracts, bay rum, essences, witch hazel, etc., in all of which its presence is highly injurious, and in those preparations intended for internal use, positively dangerous to life. A number of instances in which death resulted from the improper use of wood alcohol are given, and many cases of blindness and other diseases are cited as having been due to this dangerous substitution.

For these various reasons the annual consumption of ethyl alcohol in this country is some 95,000,000 proof gallons less than in Germany. As the population of the latter country is only about two-thirds of that of the United States, this showing is even worse than these figures would indicate. With a per capita consumption in this country equal to that of Germany, we should be using 150,000,000 gallons per year, instead of 5,000,000 gallons as at present.

Some of the purposes for which this immense quantity of alcohol would be used are shown in the statement given above of the consumption of untaxed alcohol in Germany. But in addition to these various uses there are thousands of important industries in this country which would greatly prefer to use it instead of the inferior substitutes, and which would consume many millions of gallons annually. Cheap alcohol would also make possible the establishment of many new industries for the production of articles not now made in this country, and thus give employment to American workmen in making articles now bought from foreign countries. It would also enable our manufacturers to develop an export trade in many lines from which they are now entirely shut out through their inability to sell their goods in competition with those of countries where alcohol is obtained free of tax. The total consumption for these purposes would be very large.

As an illustration I may refer to the manufacture of artificial silk, a material which is found to be an entirely satisfactory substitute for the product of the silk worm for many purposes, and which is extensively manufactured and used in European countries. This silk is manufactured from nitro-cellulose by a process which involves the use of 2 pounds of alcohol converted into ether for each pound of silk produced. Under our present laws the high price of alcohol

effectually prevents its use for this purpose, and in consequence none of this material is manufactured here. I am informed that a French company, operating under the Chardonnet process for making artificial silk, is ready to establish a factory in this country in which at least 1,000 workers would be employed, provided they can secure untaxed alcohol. This company alone would consume more than 1,000,000 gallons of alcohol annually, as well as large quantities of raw cotton, from which the nitro-cellulose is made. Another purpose for which alcohol would be largely used would be as an extractive agent for the separation of stearic acid. This substance, commonly known as oleo-stearine, is extensively used in the manufacture of lard compounds, and for various other purposes. At present it is extracted in this country by hydraulic presses, but its production by the alcohol process gives larger results. This process cannot, however, be utilized with alcohol at its present price, but with untaxed alcohol it would be generally used for this purpose.

It is, however, in the use of alcohol as a motor fuel, and for lighting, heating, cleansing and similar purposes that the greatest consumption of alcohol would take place. The possibilities for its use for all these purposes are very great, and it is certain that with the tax removed the low price at which denaturized alcohol would be sold would ensure its general consumption on an enormous scale.

Alcohol is not only a decidedly satisfactory substitute for gasoline as a motor fuel, but it is superior in many important particulars. It is clean, odorless and free from danger of accidental explosion. There is absolutely no reason why it could not be successfully used in this country as a fuel for automobiles, power-boats and launches, and stationary motors for running farm- and other kinds of machinery. The removal of the tax would therefore furnish an unlimited supply of a safe and economical power fuel, and would permit the consumption for this purpose alone of immense quantities.

Alcohol is also an excellent illuminating material, and when burned in lamps using incandescent burners, furnishes a soft, steady white light at a cost per candle-power less than that of kerosene oil. This has been demonstrated in Germany, millions of gallons being annually used in that country for lighting purposes. In addition to its low cost other advantages of alcohol for lighting purposes

are its cleanliness, freedom from danger of explosion and lack of disagreeable odor. It would undoubtedly be extensively used in this country as an illuminant if the tax were removed.

For heating and cooking, alcohol is unquestionably safer, cleaner and more agreeable to use than gasoline, and would preferably be used in millions of households for these purposes if it were furnished at the same price as that material. Small portable alcohol stoves giving out sufficient heat to thoroughly warm a large room are in general use in Germany, and it is estimated that the alcohol used for heating is as economical as anthracite coal at \$6 per ton. The adoption of a system of untaxed denaturized alcohol would make the use of alcohol as a fuel for heating purposes entirely practicable, and would be of especial advantage to those large sections of the country where coal and wood are scarce.

It is in the manufacture of the organic chemicals that the greatest field for new industries would be created by legislation giving cheap alcohol. This is practically the only line in which the United States falls far behind foreign nations, and our failure to develop this important group of industries is almost entirely due to the high price of commercial alcohol. We import annually about \$10,000,000 worth of fine chemicals, drugs, coal-tar colors, dyes, etc., chiefly from Germany, almost all of which could be, and would be, manufactured here under alcohol laws as liberal as those of the countries from which these articles are imported.

The greatest advantage which cheap alcohol gives foreign manufacturers of these products can, perhaps, be better shown by a comparison of the exports of fine chemicals from one country, Germany, with the total production of the United States. While the value of the artificial dyes annually made in this country is only about \$2,500,000, Germany exports each year more than \$30,000,000 worth of these products. The annual production of fine chemicals, drugs, etc., manufactured in this country is valued at less than \$5,000,000. The value of these articles annually exported by Germany exceeds \$50,000,000. Thus on these two lines of products, in which the advantage of the German manufacturers over those of this country is almost entirely due to cheapness of alcohol in Germany, the value of our total production is exceeded by more than \$70,000,000 by the German export trade alone. In view of these remarkable facts it is fair to assume that with our abundant capital,

skilled workmen, and great consuming power, the production of all kinds of articles in the manufacture of which alcohol is a necessary material, would, under conditions as favorable as those of foreign countries, be increased ten-fold.

While an untaxed denaturized alcohol law would thus greatly benefit our manufacturers, farmers, and workers generally, there is a most important class of industries which would receive no advantage from it. These are the industries requiring pure ethyl alcohol for manufacturing such products as flavoring extracts, pharmaceuticals, drugs, perfumery and various other articles. To meet the requirements of these industries for cheaper alcohol it is proposed to reduce the tax on distilled spirits to 70 cents per proof gallon, which would effect a reduction of about 75 cents per gallon in the cost of commercial alcohol. This would give the manufacturers pure grain alcohol at a reasonable price, and would greatly stimulate the consumption of all kinds of articles in which it is used.

To compensate for any loss of revenue that might result from the reduction in the tax rate it is proposed to levy an additional tax of 40 cents per proof gallon on all rectified, compounded or blended spirits. This would yield an annual revenue of \$3,000,000 or \$35,000,000, which would all be paid by the users of distilled spirits as a beverage.

A precedent for the imposition of this additional tax is found in our revenue laws for the Philippines, which provide for a special tax on all rectified or blended distilled liquors. It is also instructive to note that provision has been made by these laws for a very low tax rate on denaturized alcohol for industrial purposes.

H. R. 9051, the third measure to which I have referred, is one of particular interest to our export trade. While alcohol in the original tax-paid packages may be exported free of tax, no provision is made for refunding the internal revenue tax on alcohol exported as a component part of manufactured articles. Since all other commercial countries give their manufacturers tax-free alcohol for the export trade, the failure of our laws to make a similar provision has effectually prevented our manufacturers from competing in these lines with their foreign rivals or the world's trade. The enactment of the Lovering Bill would open up to our manufacturers of all kinds of articles in which alcohol is a material new and valuable markets, and enable them to secure their fair share of the world's trade.

With the enactment of the legislation provided for in these bills the important group of alcohol-using industries will be placed on an equal footing with those of foreign countries; manufacturers will find an increased demand for their products, and the consuming public will obtain better goods at lower prices.

I hope that careful consideration will be given to the facts referred to in this paper, and that all the branches of the chemical and drug trades will give these bills their continued and active support in view of the far-reaching results, as outlined in this paper, which would follow the passage of these alcohol bills.

THE USE OF METHYL ALCOHOL AND THE REDUCTION OF THE INTERNAL REVENUE TAX ON ALCOHOL.

The Pharmaceutical Meeting, held on Tuesday afternoon, February 14th, was devoted for the most part to the consideration of the questions of the use of methyl alcohol and the desirability of the Government reducing the internal revenue tax on ethyl alcohol, and providing a free denaturized alcohol for use in the arts. The papers which were read at this meeting are published elsewhere in this issue, and some of the letters which were received and read at the meeting, as well as some of the remarks made, follow.

DR. A. R. L. DOHME

wrote as follows:

There can be no doubt that it would serve the Government, the general public as well as the manufacturer, better if the internal revenue tax upon grain alcohol were reduced to 70 cents a proof gallon as proposed, for in that event the government revenue from alcohol would undoubtedly be increased and the incentive for the substitution of the dangerous wood alcohol in the arts and in beverages especially would be eliminated. There exists no longer any doubt that methyl alcohol, pure or impure, is a poison when taken internally, due to the excellent investigations of my friend Dr. Reid Hunt, formerly of our staff at the Johns Hopkins Medical School, and now of the Government service at Washington. It was my opinion, before Dr. Hunt's paper was read at a meeting of the Mary-

land Pharmaceutical Association, that the poisonous nature of wood alcohol was not due to the methyl alcohol it contained, but to its impurities, especially the amines. While these amines may still add to the poisonous nature of the wood alcohol, the fact that the methyl alcohol it contains is itself poisonous makes its use for internal administration impossible, in fact criminal. There are, of course, uses that it can and will be put to in the arts, such as varnishes, inks, chromo-lithographic work, hat manufacturing, etc., etc., because of its cheapness and the fact that it never can be taken internally. The main question before us now is whether it can safely be used for the extraction of drugs or the preparation of liniments or tinctures intended for external use only. My opinion is that it should not be used for tinctures or liniments because they may be at times used for internal use, and the wood alcohol may also be absorbed through the skin when used externally. As to its use for extracting drugs, I would say that while its use is not advisable, I really see no absolute danger connected with it, provided this extraction is made only in those instances in which all the menstruum is evaporated off at temperatures that preclude the possibility of any of it being retained in the extract remaining. Thus, in case of the preparation of extract of stramonium, the drug could be exhausted with it, and the resulting fluid extract evaporated to a pilular consistency on a water bath with careful stirring without any trace of the methyl alcohol or any of its impurities being retained in the resulting extract. However, despite this possibly safe method of extracting drugs for making their solid extracts, I personally am not in favor of its use and would not advise its use in this way to any one, because of the possible danger of all of the methyl alcohol not being eliminated, due to the lack of care on the part of the operator. If a substance is a poison, as is methyl alcohol, it is always safest and advisable to eliminate it from the armamentarium of the pharmacist, be he retailer, wholesaler or manufacturer. The temptation to save some money will, however, most probably always tempt some people to use it when they know they cannot be held criminally liable for doing so, and because this is true I sincerely trust that Congress will grant the reduction in the tax on ethyl alcohol, and thus largely eliminate this excuse for the use of wood alcohol for any purpose connected in any way with medicine or pharmacy. In Europe wood alcohol is used largely in the exhaustion of drugs for the manufacture of

alkaloids, but in this case there can be no danger, since the resulting product is crystalline and is always purified by recrystallization sufficiently to make it impossible for any to be carried over to the final product. Besides this the alkaloids are so much more toxic than the wood alcohol, even if any were carried over, that in the doses in which the alkaloids are administered, no undesirable effects could possibly be produced.

DR. HENRY W. CATTELL

said:

From my own experience I would state definitely that it is now a rare thing for the chemist to find methyl alcohol in medicines, flavoring extracts, tincture of iodin, and the better-known makes of witch hazel. The reason for this is twofold: (1) the honest manufacturer, ignorant, as we all were until a few years ago, of the dangerous qualities lurking in methyl alcohol, immediately discontinued its use in his preparations upon learning of the toxic effects of wood alcohol; (2) dishonest manufacturers—and I am glad to say that these form but a small minority—have found to their cost that methyl alcohol can be so easily detected by the present delicate tests at our command that they cannot hide the fact that they are using this preparation. As an example, I would cite the statement of the Dairy and Food Commissioner of Michigan in *Report 112*, issued a few weeks ago, that no flavoring extracts in Michigan are now found after an extended search to contain methyl alcohol, owing to the conviction of a certain party who had used 95 per cent. wood alcohol in his preparations, and to the subsequent destruction of some \$8,000 worth of his stock.

In discussing this question one must remember that a person who has once experienced the effects of methyl alcohol may enjoy this form of intoxication more than that from ethyl alcohol. There seems to be the greatest variation in the disposition of the individual towards methyl alcohol, some being able to take large quantities of it over a long period of time without any serious effects even upon the eyes. In several cases which have come under my notice among sailors and others, the methyl alcohol was specifically asked for in order to make the punch stronger. It will thus be seen that if the person desires to secure methyl alcohol for this purpose, he will undoubtedly do so—just as boys steal gasolene

from the street-lamps and suck cologne from the penny-in-the-slot machine—but I cannot substantiate the statement recently made by the Dairy and Food Commissioner of Pennsylvania that methyl alcohol is a common adulterant of the cheaper grades of whiskies.

I learn with regret that the test for methyl alcohol to be employed in the new pharmacopoeia will distinguish but 2 per cent. of methyl alcohol in ethyl alcohol, resorcinol being more delicate for the final test than phloroglucinol. If the quantity of substance at hand is large, fractional distillation will reduce the delicacy of this test many fold. There is one peculiarity in testing formaldehyde that it may be well to call attention to, namely, that the iron test seems to be much more delicate when performed in milk than under other conditions. In a U. S. Bulletin, just issued, the Association of Agricultural Chemists recommends that the following methods for discovering the presence of formaldehyde be given trial. These tests are easy of application, and are specially suited to the detection of this widely-used preservative in milk. To familiarize oneself with Rimini's method take 15 c.c. of a very dilute formaldehyde solution, and treat with 1 c.c. of a dilute solution of phenylhydrazin hydrochlorid, then with a few drops of freshly-prepared sodium nitroprussid solution, and finally with concentrated caustic soda solution. A blue color is formed, which, after a long time, changes to red. This reaction is capable of indicating formaldehyde in milk, even in a dilution of 1 in 30,000. Ferric chlorid may be used instead of the sodium nitroprussid, to be followed by a concentrated hydrochloric acid, in place of the caustic soda. By so doing a red color, which changes after some time to orange yellow, will show itself in the presence of formaldehyde. With meats and fats the formaldehyde should first be extracted with alcohol and the filtrate tested. Milk may also be shaken with an equal volume of absolute alcohol, and the filtrate tested. When the reagents are applied to dark beers the coloration may be determined by the color of the froth, just as one can do in the case of the diazo reaction in urine. In Rideal's test (*Analyst*, 1895), 100 c.c. of milk, suspected to contain formaldehyde, is distilled, and Schiff's reagent (a colorless solution of fuchsin and sodium sulphite) is added thereto, a violet red color denotes formaldehyde. Seligmann (*Zeitschr. f. Hyg. u. Infectionskrankh.*, Vol. XIL, No. 2, p. 325, 1905) detects 1-40,000 parts of formaldehyde in milk, as fol-

lows: Several drops of a weak sulphuric-acid solution are added to 5 c.c. of milk and weak Schiff's reagent is added. A reddish violet ring shows the presence of formaldehyde.

My own work with methyl alcohol has been largely upon the question as to whether or not methyl alcohol *per se* is poisonous. And granting this to be the case—as the evidence would seem to show—whether or not the methyl radical is toxic, and, if so, what preparations into which it enters may be harmful medicinally? It would seem that methyl alcohol when introduced into the system is but slowly eliminated, and that it is converted into formic acid and formaldehyde. Like arsenic, methyl alcohol and formic acid are excreted by the glands of the stomach even when introduced into the body in other channels than by the mouth, so that we have a double toxic effect of the drug upon the alimentary canal. This might even be used as a physiologic test for the detection of the presence of methyl alcohol. The theory as to ethyl alcohol being produced by the metabolic processes in the human body is again coming into prominence, and while methyl alcohol has not been discovered in nature, it may be owing to the same difficulty which physiologists have encountered in their endeavor to show that ethyl alcohol exists normally in the body.

THE SIZE OF THE DROPPER AS APPLIED TO EYE DROPS CONTAINING ALKALOIDS.

BY DR. P. N. K. SCHWENK,

An Attending Surgeon to Wills Eye Hospital and Eye Department of Pennsylvania Hospital.

There are many drugs,¹ mostly in the form of alkaloids or their salts, which, when applied to the eye, have the power of producing dilatation of the pupil (*mydriasis*), and hence called *mydriatics*, while others² have the effect of diminishing the size of the pupil (*i. e.*, of producing *myosis*), and hence called *myotics*.

Since most of these medicines are poisonous when given in excess, great care must be exercised not to apply them too freely, *i. e.*, within the prescribed dictation of the physician or oculist who prescribes.

¹ Atropine, homatropine, daturine, duboisine, hyoscyamine, scopolamine, ephedrin, mydrin, gelsemine, cocaine, etc.

² Eserine, pilocarpine, etc.

Mydriatics and myotics are usually prescribed in aqueous solutions and applied into the conjunctival sac of the eye by means of an eye-dropper. If the quantity so applied is in excess of what the conjunctival surfaces will absorb or imbibe, this excess will find its way with the tears through the canaliculi into the nose and thence into the mucous membranes of the upper air passages, from whence it is absorbed into the circulatory system. In this way you will find not a few patients return to your office much depressed and having more or less the effects of acute poisoning. If you investigate how this condition was brought about you will discover that the patient received a dropper supplying more of the drug than you intended, or in excess of physiological limits.

It is because of this condition that I have consented to again call your attention to the size of the dropper used in administering solutions containing alkaloids into the eye. Much has already been written on this subject, but from personal observation little practical attention has been given to this matter by the pharmacist compounding eye preparations.

In the AMERICAN JOURNAL OF PHARMACY for August, 1902, you will find an able and exhaustive article on "Drops as Dose Measure," by Mr. M. I. Wilbert, Ph.M., Pharmacist to German Hospital, with a long bibliography on the subject. Mr. Wilbert suggests that one drop of water should be regarded to be equal to one-twentieth part of a gramme. If this system could be made effective and droppers made to measure the indicated quantity, it would be a ready method of calculation, and also quite practical. But as this has not been adopted we still have to contend with the droppers as they exist. There is little doubt but that all oculists accept one minim as the unit of measure, and that one drop to be its equivalent, they intend that the pharmacist will give an eye-dropper that will drop only that quantity.

From the variety of eye-droppers which I here present, you will observe that every druggist has an idea of his own as to what shall constitute one drop. It is because of this irregularity in sizes and shapes that the attention of the compounding pharmacist should be awakened to the necessity of carrying out the intentions of the prescriber, thereby avoiding often much inconvenience to the patient.

From a number of trials I have found that the straight dropper

whose tip or point having a diameter of 2.00 to 3.50 mm. will most nearly drop 60 drops of an aqueous solution to the drachm. This allows an inclination of the dropper of 45° to the horizon. A drop always bears a direct ratio in size to the surface from which it drops, so that in a curved dropper the solution follows the curve to the point of rest and gives rise to a larger drop than if dropped from the point. The same is true of beaded droppers.

Curved and beaded droppers should never be given to drop solutions containing poisonous alkaloids, as they always give a surface having a diameter of over 2.50 mm., and therefore drop more than one drop or one minim.

Another point, eye droppers having the dark rubber nipples are far superior to those having red or white nipples, because the former are less sensitive or delicate to the touch. The rubber nipples should always be cleansed to rid them of rubber dust or sulphur contained therein. So then the dropper having a straight tip 2.00 to 3.50 mm. in diameter with a black or dark rubber nipple is the one to prescribe with alkaloid solutions.

THE DESIRABILITY OF A STANDARD EYE DROPPER.

After the reading of Dr. Schwenk's paper on "The Size of the Dropper as Applied to Alkaloids in Eye Drops" at the Pharmaceutical Meeting on January 10th, the following remarks were made:

DR. WENDELL REBER

said :

"I quite agree with Dr. Schwenk as to the desirability of having a standard dropper, if that were practicable. Unfortunately that does not yet seem feasible. What with solutions varying from *alcoholic* to *viscid* in character and of all grades of specific gravity, it does not seem now possible to bring either the public or the pharmacist to the point that they will be willing to take the trouble to discriminate between droppers for aqueous and those for other liquids. For a numbers of years I have felt the need of protecting the public against the poisonous effects of the powerful drugs used in eye work that may result from the use of droppers with too large an aperture. So far it has been possible to avoid this by resorting to a simple practical measure. It is my invariable rule in hospital or

private work to caution the patient to make pressure with a soft handkerchief just over the inner corners of both eyes, where are located the tops of the tear ducts. In this way any excess solution is immediately absorbed by the handkerchief and is prevented from running down the tear canal into the nose, there to be absorbed into the general circulation. In this connection it is well to remember that the mucous membrane of the nose is twice as absorptive as that of the stomach, so that the entrance of $\frac{1}{100}$ of a grain of an alkaloid there would be equal to the entrance of $\frac{1}{50}$ of a grain by the stomach.

"As to sterilizing solutions, whether in droppers or in bottles, it must be borne in mind that many of the alkaloids used in ophthalmic work are very delicate in nature and may be split up into different compounds by boiling. Cocain, for instance, loses much of its anesthetizing power by boiling. I recall a man upon whom I operated for cataract. I could not understand why he was so unruly during the operation. He seemed to experience very much more pain than most such patients. Two weeks later while operating on another cataract patient, I used a boiled cocaine solution in the way that we commonly use cocaine, and at the end of fifteen minutes began the operation. His sensitiveness was so great that I stopped, and used three instillations of a similar strength cocaine solution that had not been boiled. Within ten minutes the eye was absolutely insensitive, and the cataract was removed without the slightest twinge of pain. This observation I have repeatedly confirmed, and I am convinced that while the special anæsthetic properties of cocaine are not entirely destroyed by boiling, they are so reduced that the boiled solution becomes practically worthless. The best way to prepare the solution to be used for such purposes is to boil a saturated boracic acid solution, and when it has cooled to about 98° or 99° F., to dissolve in it such amount of cocaine as the surgeon may desire. Even if an absolutely sterile cocaine solution might be obtained, it would not be worth while taking the trouble, as there are no eye-lids absolutely free from bacteria. Eyre, and also Arnold Lawson, of London, examined the inner surface of the lids of fifty normal eyes in healthy persons, and found three to five different kinds of bacteria of varying virulence in all but two or three. Gifford, Omaha, Neb. (one of our foremost bacteriologists in ophthalmic science), scrubbed the

outer and inner surface of the lids with a boracic acid solution and afterward flushed the eyes with a warm boracic acid solution, and, in spite of all this care, was not able to secure an eye free from micro-organisms.

And yet this last statement should in no wise deter us from approaching as close to absolute cleanliness as possible in all that is done about the eye. Droppers should be thoroughly rinsed each time before using. The eye or eyes should be thoroughly flushed with warm boracic acid solution, and any and all instruments boiled (excepting those with sharp cutting edges which should be immersed for half an hour in absolute alcohol) before introducing them into the eye. If we cannot make the eye sterile we can at least make the instruments and eyes as clean as possible. Experimental bacteriology has proven that when the number of bacteria is reduced below a certain quantity and the soil made uncongenial, there is little, if any, danger of infection, hence the imperative need for simple absolute cleanliness.

M. I. WILBERT

said :

" The International Conference for the Unification of the Formulæ of Potent Medicaments, held at Brussels, Belgium, in 1902, recommended the adoption of a normal drop counter, having an external dropping surface of 3 millimetres, and dropping, at 15° C., drops that will weigh 0.05, or the equivalent of one-twentieth of 1 c.c.

This recommendation has been officially adopted by every country represented at the conference, with the exception of Germany and the United States, and will, no doubt, go far towards correcting the various existing ideas regarding drops. For general use, as dose measures, even the universal adoption of this standard drop and dropper will not overcome the inherent tendency to alter the size of the dropping surface, and with it the size of the drop, by changing the angle at which the dropping device is held. One other serious defect with even the best of our generally used pipette droppers is the difficulty of instilling one or two drops into the eye, without causing an accidental deluge of drops to inundate the eye, and causing the unexpected untoward effects referred to by the doctor in his paper. The Germans have overcome this latter

tendency, and have also partially overcome the former by dispensing potent eye drops in special containers. These consist of a small vial having a perforated stopper, through which is introduced a corrugated or twisted glass rod that answers as the dropping device. The evident advantages of this device are that the glass rod does not hold more than two, or at the most three drops at a time, that the drops form and disengage slowly, and are in addition to this but slightly effected by any unavoidable jar or tremor. Among other advantages that might be claimed for this device are the fact that it may be readily sterilized, and that there is less likelihood of there being a marked change in the strength of the solution, caused by the evaporation of a portion of the solvent remaining in, or on, the pipette or dropper.

CAMPHOR SNOW AND MILK OF CAMPHOR.

WITH SEVERAL ADDITIONAL FORMULAS FOR UNCTUOUS, NON-GREASY
PREPARATIONS FOR CHAPPED HANDS AND LIPS.

By M. I. WILBERT,
Apothecary at the German Hospital, Philadelphia.

Claudius Galenus, who was born in Pergamum, Mysia, about the year 130, and whose name, even to-day, is the recognized synonym for medicinal preparations, is said to have been the first to recommend a mixture of grease and water as a cooling and soothing application to the inflamed or irritated skin.

The widely used and variously constituted cold creams of the drug shops, as well as the more uniform, though frequently less elegant, *unguentum aqua rosæ* of the pharmacopœias, are at best but modifications of the original mixture of grease and water recommended by Galen more than 1,700 years ago.

From the point of view of the consumer, the present-day successors of the *ceratum galeni*, *unguentum leniens* or *unguentum refrigerans* of the early apothecaries are still far from being perfect toilet preparations. The most elegant preparation of cold cream, while it may be a neutral, bland and cooling ointment, is at best greasy, and on this account, if no other, is frequently objectionable as an application for chapped hands particularly.

The discovery of glycerin, in the early decades of the nineteenth century, added a new, and in many respects a most desirable, cura-

tive agent for external application. But even glycerin is not a specific, and with many individuals is more irritating than soothing, particularly when undiluted.

To obviate the greasy nature of the one or the irritating, even caustic, action of the other, innumerable suggestions and recipes have been published from time to time. Among the more practicable of these suggestions we may mention the reduction of the relative amount of the grease or oil in the case of cold cream, and the addition of non-objectionable diluents to the glycerin. As an example of a dilute mixture of an oil with water, the following saponaceous mixture, provisionally called "camphor snow," may be tried :

Agar-agar	3 grammes
Water	150 "
Stearic acid	15 "
Sodium carbonate	10 "
Oil of theobroma	15 "
Water	100 "
Alcohol	10 "
Camphor	5 "

The necessary apparatus consists of a so-called farina boiler, or a suitable water-bath, and an egg-beater. The process of mixing is simple, though the following directions may appear to be somewhat complicated.

Dissolve the agar-agar in 150 c.c. of water and strain. To 100 c.c. of water in a farina boiler, or any suitable dish on a water-bath, add the stearic acid and the sodium carbonate ; after the carbon dioxide has been driven off, add the oil of theobroma and the solution of agar-agar ; mix thoroughly by means of the egg-beater ; then remove the container from the water-bath, or source of heat, and continue beating or agitating the mixture until a uniformly smooth lather, measuring about three times the volume of the contained liquids, results.

When nearly cold add the camphor, dissolved in the alcohol. A preparation of this kind can, of course, be varied by the substitution of any desirable perfume or odor for the camphor, or by the substitution of any other desirable fatty oil for the oil of theobroma, or by the substitution of Irish moss or casein for the agar-agar.

Another rather interesting possibility, as a toilet article, is a cream-like emulsion of fatty oil. This, to prevent its being con-

founded with the well-known saponaceous emulsion of oil of turpentine, sometimes called "camphor cream," we will provisionally call "milk of camphor."

It consists essentially of a mixture of a fatty oil, oleic acid and spirit of ammonia with water, and the base is practically the same as petrox, for which a formula was given in this JOURNAL some time ago. (AMERICAN JOURNAL OF PHARMACY, 1901, p. 220.)

A typical formula for a preparation of this kind would be:

Spirit of ammonia	5 grammes
Oleic acid	10 "
Oil of cotton-seed	20 "
Camphor	1 "
Water to make	150 "

To the cotton-seed oil, in a dry bottle or suitable container, add the oleic acid, followed by the spirit of ammonia. In this mixture the camphor is readily dissolved. Now add the water in quantities of from 5 to 10 c.c. at a time, and shake or stir until a uniformly smooth emulsion has been formed. This preparation, like the preceding one, can be varied by using a mineral oil or oil of sweet almonds, or by substituting any more desirable perfume or odor for the camphor.

Among the more desirable preparations of glycerin, a mixture of equal parts of glycerin, rose water and solution of peroxide of hydrogen is probably the most satisfactory. The latter ingredient in this preparation is a particularly useful one, and contributes very materially to its efficiency.

The following may be taken as a type-formula for "glycerin jelly:"

Chondrus	15 grammes
Distilled water to make	420 "
Glycerite of boroglycerin	80 "

Boil the Irish moss on a water-bath with sufficient water to make 420 c.c. of jelly and strain; while still warm add the glycerite of boroglycerin. When nearly cold add any desirable perfume or flavor. Here again the resulting product may be varied by substituting agar-agar, gelatin, tragacanth, starch or quince-seed for the Irish moss; also by replacing the boroglycerin, in whole or in part, by glycerin. The perfume may be varied at will, and may include any one of the thousand and one available odors.

In conclusion, it may be said that preparations that are designed for toilet use may, and properly should, have distinctive characters. They illustrate, much better than the strictly medicinal preparations, the best efforts of the pharmacist for elegance and neatness, and they constitute a legitimate and very valuable opportunity for him to demonstrate his skill and ability.

PROGRESS IN PHARMACY.

A QUARTERLY REVIEW OF SOME OF THE RECENT LITERATURE RELATING
TO PHARMACY AND MATERIA MEDICA.

BY M. I. WILBERT,
Apothecary at the German Hospital, Philadelphia.

The past year brought us more than the usual number of foreign visitors, who were more or less interested in chemistry, pharmacy and the allied sciences. These visitors were attracted to this country largely by the Louisiana Purchase Exposition, and the accompanying congresses. Many of these visitors, on their return to their native countries, expressed themselves rather freely on the unsatisfactory conditions existing in the present-day practice of pharmacy in America. Ignoring entirely the unfavorable opinions expressed by German writers, we may be permitted to quote from a few of our other foreign visitors, who appear to have been hardly less unfavorably impressed.

A recent number of the *Chemist and Druggist* (London, December 10, 1904, page 948) quotes from an address by Prof. A. V. Pell, before the St. Petersburg Pharmaceutical Society, and says: "Professor Pell described the pharmacies of the United States as occupying an exceedingly low level. They are not pharmacies, but shops dealing in various drinks, such as soda-water, milk, whisky, etc., among which could be found some medicinal substances of an altogether suspicious nature; and the medicines, quite unequal to the pretensions, are sold at fabulous prices, being two or three times as dear as in Russia. The dealers generally have no special knowledge, which the Government on its part does not exact. The American only troubles about business requiring large capital and yielding large profits."

This statement, from the eminent Russian, is possibly too general in its tone to be taken very seriously. The following, taken from a

recent number of the *Pharmaceutical Journal* (December 3, 1904, page 820), is rather more direct and more specific:

Mr. Joseph Colman, a member of the Pharmaceutical Society, says: "The first thing that struck me about American Pharmacy is that, for the most part, if I may use the paradox, it is not pharmacy at all, as Europeans understand the word. In America the drug-store is a place where hats are cleaned, where cigars, and candy, and cutlery, and the inevitable soda fountain, combine to reduce to a minimum the attention bestowed on drugs. There are in New York, Chicago and other large cities a few pharmacies of the English type, but even there the candy and the soda-water are not wanting.

"I think the difference between American and British pharmacy is to be found in this fact: Pharmacy has developed here as an outgrowth from the medical profession—the old apothecaries were both doctors and druggists. But on the other side the history is altogether different. Pharmacy has grown—and, up to now, not grown to any lofty height—out of the general store—out of the grocery, if you like. There is, however, plenty of hope for the future, and that hope lies in the gradual awakening to the truth on which British leaders of pharmacy have always insisted—that in scientific education, if anywhere, lies the foundation for pharmaceutical progress."

A Frenchman, Jules Huret, editor of *Figaro*, Paris, says: "For the European traveling in America nothing is more surprising than the shops of the apothecaries. They call themselves druggists, chemists, pharmaceutical chemists, or, when of German origin, Apotheker. The ordinary apothecary shop is a veritable bazaar. Over the door we may find, in modest letters, the word 'Drugs,' while extending out over the sidewalk is a large sign, with immense letters, announcing 'Ice-Cream Soda,' the favorite beverage of the native American. In addition to this leading article we find the tobacco counter, and, adjoining that, confectionery, paper, brushes, combs, sponges, toilet articles and perfumery. We may also find razors, artists' materials, playing cards, sporting goods and, everywhere, the public telephone at five and ten cents a call. In addition to these commodities we can in many cases secure carriages, express wagons, moving vans, messengers, servants, stamps, and even money orders, by mail or express.

"The American drug store frequently contains a circulating

library, is used as a waiting-room for the street railways and furnishes news, gossip and general information to all that apply. If we observe closely, we will find that, in addition to all of these commodities, there is, in an obscure and out-of-the-way portion of the store, a small section containing the drug department, where prescriptions are said to be compounded." (*Phar. Post*, 1904, page 714.)

We in America are, however, not the only ones that are slightly backward in our scientific development. This is evidenced by a recent article on "Retrospect and Prospect of Pharmacy," by Mr. David Murray (*Phar. Jour.*, 1904, page 864), who says: "If pharmacy is yet to be recognized as an organized profession, or if pharmacists are to revive the respect due to their rights, it will only be conceded to when pharmacists, individually and collectively, have proved by education and organization that they merit such attention."

Another writer in the same journal (*Phar. Jour.*, 1904, page 848) says: "After everything that could be done to protect trade interests during recent years has been done, pharmacists are still faced with the difficulty of convincing the legislature and the public that they have a just claim to be regarded as a distinct professional class."

No doubt the reasons for this comparatively unsatisfactory condition of pharmacy in Great Britain, as well as in America, is to be found in the low standards of pharmaceutical education.

A synopsis of the pharmaceutical education required by the several European governments, which was republished in a recent number of the *Pharmaceutical Journal* (December 3, 1904), is particularly interesting in this connection. From this synopsis it appears that, with the single exception of England, the large Continental countries require from five to ten years of special study for the prospective pharmacist. All of the Continental countries, in addition, require the equivalent to matriculating at the universities as a preliminary requirement.

The Metric System of Weights and Measures in Great Britain.—The secretary of the "Decimal Association," in a communication to the *Pharmaceutical Journal* (December 24, 1904, page 951), asserts that prospects are very favorable that the metric weights and measures bill will be acted on favorably by the House of Commons at an early date.

Over 330 votes of members of Parliament have been promised in support of the bill in the lower house. The secretary also recounts a list of representative bodies who have petitioned Parliament in favor of the reform.

The Metric System in Medicine.—The impending introduction of the metric system of weights and measures into Great Britain has been the direct cause of considerable discussion on the supposed shortcomings of that system from a practical point of view.

While many of the points are, perhaps, not very well taken, and while many of the suggestions that have been made are quite impracticable, there is one, a practical name for the quantity of a fluid contained in a cubic centimeter, that has made its appearance in a recent number of the *Pharmaceutical Journal*, and is well worth repeating. This quantity, frequently referred to as c.c., it is proposed to call a mil, from milli liter, the thousandth part of a liter. If this name were generally adopted we could have deci-mil, centi-mil and milli-mil, for the tenth, hundredth and thousandth part of a c.c.

Proprietary Medicines in New Zealand.—According to a recently published regulation the government of New Zealand will require that after June 30, 1905, "All patent medicines imported or sold in the colony must have the contents, with their exact proportions, legibly printed on the bottle, box or container, and if any poison is contained in the medicine, the words 'This contains poison' must be added. (*Phar. Jour.*, 1905, p. 94.)

The History of Pharmacy has attracted more than usual attention during the past three months. In Germany a most comprehensive *History of Pharmacy*, by Hermann Schelenz, has but recently been published by Julius Springer, Berlin. This book contains upwards of 900 pages and includes a history of pharmacy and the allied sciences from the earliest times to the present.

The History of the Paris School of Pharmacy, which has been in press for nearly a year, is said to be ready for distribution in the near future. A copy of this book, which, as will be remembered, is being published as a memorial of the centenary of the Superior School of Pharmacy was shown at a recent meeting of the Society of Pharmacy of Paris, where it elicited favorable comment.

The Pharmacopœia as a Reflection of Contemporary Development is the title of a series of articles contributed by Prof. A. Tschirch (*Schweiz. Woch. Schr. f. Chem. u. Pharm.*, 1904, p. 602, et seq.) on

the origin and development of the several pharmacopoeias published in Europe. From these articles it would appear that the first official pharmacopoeia was published in Nürnberg, Germany, in 1546.

An interesting sketch of the origin and continuance of the *Pharmaceutical Journal*, by the veteran writer, Mr. Joseph Ince, has recently appeared in the pages of that journal. (*Phar. Jour.*, 1904, p. 804.) From this sketch it would appear that the *Journal* began in 1841 as a private enterprise, being owned and controlled by Mr. Jacob Bell. It was the first journal of its kind to be published in Great Britain, and is to-day the second oldest pharmaceutical journal published in the English language.

Among the early contributors are enumerated such representative British pharmacists and scientists as Dr. Andrew Ure, Professor Redwood, Prof. George Fownes, Prof. Jonathan Pareira, Thomas Morson, Dr. W. F. Daniell, J. B. Groves, who were in turn followed by such men as Daniel Hanbury, John Barnard, Robert Bentley and the still surviving Joseph Ince.

From 1841 to 1870 the *Journal* was published as a monthly; since 1870 it has been published in its present form as a weekly.

The Year Book of Pharmacy, containing a complete account of the meeting of the British Pharmaceutical Conference at Sheffield, England, has been distributed to the members. In addition to the papers read at the Sheffield meeting, this book also contains a well arranged and quite exhaustive review of the current literature relating to pharmacy.

In this connection it is also announced that a general index covering the volumes from 1886 to 1903 will be ready soon and that the price for this index has been fixed at the moderate sum of 3s. 6d., post free. For those who desire a copy of the previous index, 1864 to 1885, the two volumes will be supplied at 5s. 6d., post free.

The first number of the *Journal de Pharmacie et de Chimie* for 1905—the ninety-sixth year of its publication—appears with the name of M. Bourquelot as the principal editor. M. Emile Bourquelot, it will be remembered, is the head pharmacist at the Laennec Hospital, Permanent General Secretary of the Society of Pharmacy of Paris, Professor of Galenical Pharmacy at the Superior School of Pharmacy, Paris, and has but recently been appointed a Chevalier of the Legion of Honor. M. Bourquelot comes to his new position well prepared. He has been a frequent contributor to phar-

maceutical literature, and has been on the editorial committee of the *Journal de Pharmacie* for a number of years.

Adulterated Digitalis.—An examination of the powdered digitalis leaves in a number of Austrian pharmacies has disclosed the fact that some of the supposed digitalis consisted of powdered *Verbascum* leaves. (J. Moeller, *Phar. Post*, 1904, page 677.)

Dr. Wilhelm Mitlacher, in a more recent number of the same journal (*Phar. Post*, 1905, page 41), reports finding two samples of supposed digitalis leaves that consisted entirely of a mixture of *Verbascum* and *Inula Conyzia* D. C. (*Conyzia Squarrosa* L.).

Adulteration of Oil of Eucalyptus with Castor Oil was recently reported by C. J. Bennett (*Chem. and Drug.*, 1905, page 34). From the reported characteristics of this particular mixture, it would appear to be one that is not readily detected in the ordinary way.

A ready method to distinguish pure sulphate of quinine from the commercial article. If 0.2 gramme of the quinine salt be dissolved in 5 c.c. of a mixture of 30 volumes of petroleum ether (spec. grav., 0.68) and 70 volumes of chloroform, the filtrate when diluted with three times its volume of petroleum ether, will remain perfectly clear if pure quinine sulphate has been used. Other cinchona alkaloids, when present, will give a distinct precipitate. By this method, it is asserted, an admixture of 0.1 per cent. of foreign alkaloids to quinine may be detected (*Zeitschr. f. Anal. Chem.* through *Zeit. d. Allgemein. Oest. Apothek. Ver.*, 1904, 1370.)

Antichoren.—This is said to be a mercuric iodochloride. It occurs as a dark-brown amorphous substance that is soluble in water in all proportions. When given internally it is readily absorbed, and may be advantageously substituted for the usual mercurials in syphilis. It is given in doses of 0.01 three or four times a day. (*Suddeut. Apoth. Zeit.*, 1904, page 889.)

Castor Oil in powder form.—A recent German patent provides for the mixing of an emulsion of castor oil with an equal weight of calcined magnesia, the added water is subsequently evaporated and the resulting mass powdered. (*Suddeut. Apoth. Zeit.*, 1905, page 36.)

Formane, a combination of formaldehyde and menthol as an inhalation, is said to be a useful remedy for cold in the head. The following is a typical formula :

Menthol, 10.; formaldehyde, 5.; oil of geranium, 0.5; mix and use in a smelling bottle. (*Phar. Jour.*, 1904, page 967.)

Jaborandi Leaves of Commerce.—E. M. Holmes (*Phar. Jour.*, 1904, page 891) says that for some years there has been great difficulty in obtaining the jaborandi leaves official in the British Pharmacopœia.

During this period a considerable quantity of the Rio and Maranham jaborandis have been on the market. The latter, *P. microphyllus*, usually comes into the market in good condition, and yields, according to Paul and Cownley, as much as 0.84 per cent. of a crystalline nitrate of pilocarpine that, like the alkaloid obtained from *P. jaborandi*, appears to be a mixture of two nitrates—one, isopilocarpine, having a melting point of 159°, and the other, pilocarpine, melting at 146°.

Rio jaborandi (*P. pennatifolius*) varies much in appearance, and does not yield more than half the amount of crystalline alkaloid usually obtained from the Pernambuco or Maranham varieties.

Kryptol.—This is a grayish-black, granular substance, having considerable electrical resistance. It is composed of clay, carborundum and graphite, and is said to have a melting point that is upwards of 3,000° C. It is being used to economically convert electrical energy into heat. (*Suddeut. Apoth. Zeit.*, 1904, p. 790.)

Menthyl Camphorate.—The camphoric acid ester of menthol; this is a white substance, insoluble in water or chloroform, but soluble in alcohol, ether and the fatty oils. It melts at 86° C., and is decomposed by boiling water. (*Zeitschr. d. Oest. Apoth. Ver.*, 1904, p. 1518.)

Salibromin.—This has been recommended as an antiseptic remedy for rheumatism and as a febrifuge. It is insoluble in water and in acids. Given in doses of 0.50 and as much as 5.00 in twenty-four hours. (*Phar. Jour.*, 1904, p. 852.)

Trigemin, a mixture of butyl chloral and pyramidon, occurs in long acicular crystals, melting at 85° C., and freely soluble in water. Used as an analgesic. (*Zeitschr. d. Allgemein. Oest. Apoth. Ver.*, 1904, p. 1518.)

Zinc Borate, or Oxyborate.—This is a powder combining the antiseptic properties of boric acid with the drying and absorbent properties of oxide of zinc, and may be made by the following formula:

Dissolve 500 grammes of zinc sulphate in from 5 to 10 liters of

water, and add to this solution 443.6 grammes of borax mixed with 309 grammes of a 15 per cent. solution of caustic soda, collect the precipitate, wash until free from sulphates and dry. (*Phar. Jour.*, 1905, p. 75, from *Arch. d. Phar.*)

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

TRAITE ELEMENTAIRE DE PHYSICO-CHIMIE, ou lois générales et théories nouvelles des actions chimiques. Par M. Emm. Pozzi-Escot. Paris: Librairie Polytechnique. Ch. Béranger, Editeur. 1905. Pp. 627.

This is a text-book of general chemistry as interpreted by the modern physical chemists and is a very complete and satisfactory presentation of the views held to-day on this subject. It is, moreover, a presentation of these views in which mathematics is avoided as far as possible, so as to make it understood by the average chemist who does not wish to undertake the study of certain parts of mathematical physics, such as thermo-dynamics, as a preface to physical chemistry.

The well-known fundamental laws of chemistry, such as those of gaseous combination, the atomic theory and the meaning of valence and its applications in the establishing of chemical equations, are first reviewed; the properties and general laws of the gaseous state are then discussed, followed by an account of specific heats of the elements and a classification of the elements. In the latter, the periodic system of Mendelieff is fully explained and deductions from the same noted. At the end of this chapter mention is made of the discovery of the five rare inert atmospheric gases by Ramsay, and that their discoverer had fitted them into the periodic system constituting a group for themselves, but the author does not incorporate them in his table of elements as is now generally done.

The next chapter, dealing with the properties of liquids, describes the phenomena of molecular diffusion of liquids and from that goes on to speak of osmotic pressure, which is well explained with the aid of several simple illustrations which help one in the understanding of this important phenomenon and its meaning. This leads to the statement of the modern theory of solutions as first proposed by Arrhenius.

Thermo-chemical changes are discussed in a separate chapter and endothermic and exothermic reactions illustrated, the methods of calorimetric measurement of chemical changes being also described. An account of luminous radiations includes the subjects of photometry and spectroscopy, as well as a description of the newer forms of radiation, such as the Roentgen rays, the N rays and the phenomena of radio-active matter, in connection with which Crookes' interesting speculations on the changeable nature of matter are noted. The newest results of Ramsay and Rutherford are not mentioned, however.

No book on modern physical chemistry would be complete without an account of Gibbs' famous phase rule and the various systems of equilibrium in chemical reaction, and this we find well explained in Chapter XV. A discussion on electrolytic phenomena which develops the idea of the ion, and a final chapter on the application of the theory of the ions and the scientific principles underlying analytical chemistry, complete the book.

No one wishing to master the principles of chemistry and its wide-reaching possibilities can any longer ignore the great development of physical chemistry which has taken place in the last decade or two, and for one able to follow in the French language the book seems to furnish an excellent and not too mathematical survey of the field.

S. P. SADTLER.

IN MEMORIAM CHARLES RICE. Printed for private circulation by J. B. Lippincott Co., Philadelphia, 1904.

This is a neat octavo volume of sixty pages, with seven inserts containing appropriate and well executed illustrations. Bound in full black leather, with gold lettering, this little volume represents probably the acme of the printer's and bookbinder's art. In style and appearance it is thoroughly in harmony with the man whose name it is designed to perpetuate and to honor.

The first nineteen pages are devoted to a general outline sketch of the life of Charles Rice, while the remaining pages contain a list of the "Degrees, Titles and Memberships of Dr. Charles Rice;" "A Bibliography of the writings of Dr. Charles Rice;" "Personal impressions and recollections of Dr. Charles Rice;" "Resolutions of the Board of Trustees of the United States Pharmacopœial Convention;" "Resolutions of the College of Pharmacy of the City of

New York;" "Resolutions of the National College of Pharmacy;" "Dedication of the Monument to Charles Rice, Ph.D.," and "The Rice Memorial Committee."

In the biographical sketch, unfortunately, there is a most lamentable absence of detailed information, in connection with the numerous subjects enumerated. For this general lack of detail there can be but two reasonable reasons—dearth of material, or lack of funds. The former of these can hardly be accepted as valid, while the latter would constitute a lasting disgrace to the profession of medicine as well as to that of pharmacy, as the standing of both of these professions has been manifestly advanced by the disinterested efforts of this lone, and in many respects lonely, man.

It would, for instance, be interesting to know how Charles Rice, who, as one writer in this memoir suggests, was but an insignificant part of a great political machine, contrived, "despite the vicissitudes of political fortune," to conduct his own individual department on such a high ethical plane that even the leaders of that political machine did not essay to dictate, or even to suggest to him what his policy should be or how he should conduct his department. Recognizing the difficulties under which he labored, it would be interesting indeed to know how Charles Rice, for thirty-five years, was able to personally conduct and direct the work done in the largest general drug bureau in this country, to the complete satisfaction of the numerous interests involved and with credit to himself and his assistants.

It would also be interesting to know how, through all this period of time, while engaged in work so foreign to research and study, he was able to preserve his interest in all that pertained to Oriental literature and languages.

Last, but by no means least, it would be interesting to know how, in addition to all this, Charles Rice was able to take such an active, or, as is generally admitted, the leading part in producing the two works that will ever be recognized as being pre-eminently the leading features of the American pharmacy of the latter decades of the nineteenth century; the sixth decennial revision of the United States Pharmacopeia and the National Formulary. As Chairman of the Committee of Revision of the United States Pharmacopeia and as Chairman of the Committee on National Formulary of the American Pharmaceutical Association, Charles Rice essayed to do, and did

do, work that will be recognized as a credit to pharmacy in time still to come.

A more detailed account of the work done in connection with these two works alone would prove interesting and would be of inestimable value as an incentive for better work on the part of future pharmacists. Information relating to this particular feature of his work must be still available. It can hardly be supposed that of the thousands of circular letters, written and prepared by him himself, none have been preserved. But, even if this were true, we still have the voluminous report of the Committee of the American Pharmaceutical Association on the Revision of the United States Pharmacopœia, published in 1880; the files of the proceedings of the American Pharmaceutical Association; the National Formulary; the Pharmacopœia of the United States; the Digest of Criticisms, and last but not least, the personal recollections of a number of his co-workers and contemporaries who should, and no doubt would, furnish the information necessary for a more extended sketch of this eminent pharmacist. It is sincerely to be hoped, therefore, that this little volume is but a forerunner of something still more elaborate in the future, and that the present, or at least the succeeding Pharmacopœial Revision Committee may see its way clear to collect and record much that will be of interest in connection with a study of the life work, times and surroundings of this truly noble, original and unselfish worker in the field of pharmacy.

M. I. W.

THE URINE, THE GASTRIC CONTENTS, THE COMMON POISONS AND THE MILK. By J. W. Holland, M.D., Professor of Medical Chemistry and Toxicology, Jefferson Medical College of Philadelphia. Seventh edition, revised and enlarged. P. Blakiston's Son & Co. 1904.

This handy laboratory manual, embracing as it does the clinical microscopy and chemistry of the urine, as well as the clinical chemistry of the gastric contents, the common poisons, including alkaloids and the milk, is a most compact, as well as trustworthy, laboratory guide for the practical clinician or the up-to-date pharmacist.

It is a substantially bound working guide, with every other page blank, for the addition of certain data which the practical man should have in close proximity to the original considerations.

One valuable feature of this volume is that it not only describes instruments that are upon the market for performing the special

tests and methods of applying the same, but frequently gives a method whereby a few pieces of glass tubing or a common test tube will practically accomplish the same results with much less expenditure. It might also be noted that methods for the centrifugal estimation of the mineral sulphates, phosphates and albumin prove a valuable addition, as well as the latest tests for the presence of sugar in the urine; formaldehyde in milk, and Ewald's test for the condition of the stomach. In connection with some of the tests for abnormal constituents of the urine, the following subdivisions are noted, which in themselves should commend it to a careful worker, namely, principal reagents, methods of applying, test precautions to be observed, fallacies and delicacy of tests, volumetric, gravimetric or centrifugal estimations, objections to and advantages of these methods. It might also be noted that the preparation of artificial morbid urines for practicing the various tests, Freund's method for the determination of acidity, preliminary standardization, and Toepler's method for estimating free and loosely combined acids, are among the latest additions to this publication.

W. S. WEAKLEY.

EDITORIAL.

PROPOSED AMENDMENT TO THE PHARMACY ACT IN PENNSYLVANIA.

The requirement of graduation from a college of pharmacy prior to examination by a board of pharmacy has been unanimously indorsed by the American Pharmaceutical Association, the various State pharmaceutical associations, and the International Pharmaceutical Congress, which met in Chicago at the time of the Columbian Exposition, as well as by other organizations interested in pharmaceutical progress. (See AMERICAN JOURNAL OF PHARMACY, August and September, 1904.)

While the proposition favoring the enactment of a law requiring every applicant for a proprietor's or manager's certificate to be a graduate of a reputable college of pharmacy, probably originated in Pennsylvania, it has remained for New York State to first pass a law of this kind.

A bill of this kind is again before the Pennsylvania Legislature, and the only changes proposed in the present Pharmacy Act are the following:

(1) A candidate for a proprietor's or manager's certificate must produce satisfactory evidence that he is a graduate of some reputable and chartered college of pharmacy.

(2) The amendment does not become operative until January 1, 1906, and it *only applies* to those going into business after that time; it does not affect druggists *already in business* or clerks applying for qualified assistants' certificate before the Board.

This subject has been so frequently discussed that it seems hardly necessary to present any further arguments in support of legislation of this kind, but in order that the pharmacists of this State may realize the necessity for writing to their respective senators and representatives, so that they may be assured that there is a real need for the enactment of the proposed amendment, we here present some of the more specific reasons for its enactment, as set forth by Prof. Joseph P. Remington.

(1) The amendment is needed to elevate pharmacy to the standard which the retail pharmacist of the State is entitled to, because his position is most responsible before the community, and the greater attainments of the pharmacist of to-day warrant the same recognition at the hands of the public as that accorded to physicians and dentists of this State, who have the same provision in their medical and dental laws.

(2) The passage of such an amendment does not work hardship upon any druggist doing business in the State to-day, and on account of the prerequisite law now operative in the State of New York, the passage of this amendment will prevent a flood of druggists who are not graduates from coming into this State and going into business here, because they are unable or unwilling to qualify themselves so as to comply with the law in the State of New York. As a protective measure it especially commends itself at this time.

(3) A profession, trade or occupation which is united in the work of excluding uneducated and incompetent men from lowering the standard of the whole must commend itself to your judgment.

(4) The American Pharmaceutical Association, the Pennsylvania Pharmaceutical Association, the Philadelphia Retail Druggists' Association, the colleges of pharmacy and the State Board of Pharmacy have passed resolutions or have signified their approval of this amendment.

(5) The medical profession, as a body, throughout the State

favor it because any measure which improves the practice of pharmacy by demanding higher educational requirements from the manager or proprietor of a pharmacy, increases the value of the physician to the public, because if the doctor's prescriptions have not been intelligently and safely compounded, his efforts to save the patient's life are null and void.

When we consider the benefits that have accrued to the medical and dental professions in the State of Pennsylvania since the enactment of the laws requiring that only those who can practise these professions in this State shall be graduates of reputable medical and dental schools or colleges, it is but fair to ask that the pharmaceutical profession receive equal consideration at the hands of our legislature. The advances in one of these professions should be followed by similar advances in the others, as they are more or less allied in their aims, and are all more or less intimately concerned with the public health.

DR. FRIEDRICH HOFFMANN.

The news of the death of Dr. Friedrich Hoffmann, at his home in Berlin, on November 30th, was more or less anticipated, for it was known to his friends that his health had been in a precarious condition for some years past. Dr. Hoffmann spent the best years of his life in this country, and to him American pharmacy is much indebted for the progress made during that time. Dr. Hoffmann was elected an honorary member of the Philadelphia College of Pharmacy December 30, 1895, and we feel that we cannot do better than to give the sketch of his life prepared by his friend and co-laborer, Dr. Frederick B. Power, which appeared in the *Chemist and Druggist* (London), December 10, 1904:

"It is a sad duty for the writer of these lines to record the death of one of the veterans of scientific pharmacy, Dr. Friedrich Hoffmann, which occurred at his home in Charlottenburg on November 30th. The realization of the loss which has thus been sustained, and which will be deeply felt by a large circle of professional associates, becomes accentuated to one who for thirty years had known him in the more intimate relations of a true and kind friend.

"Friedrich Hoffmann was born in Wriezen-on-the-Oder on June 20, 1832. His early instruction was received from his father, who was distinguished both as a theologian and philologist, and was at one time a councilor of the Consistory at Stettin. He then attended

the Joachimsthal Gymnasium in Berlin, and in 1847 began his apprenticeship in pharmacy. From 1854 to 1856 he studied at the University of Berlin, where it was his privilege to receive instruction from such eminent teachers as Mitscherlich and Heinrich Rose, in chemistry; Otto Berg and Alexander Braun, in botany and pharmacognosy; Ehrenberg, in microscopy; Dove and Magnus, in physics; Johannes Müller, in physiology; and Carl Ritter, in comparative geography. But a little more than a year has passed since the writer had the opportunity of walking with Dr. Hoffmann through the grounds surrounding the old University buildings in Berlin, and many interesting and touching reminiscences were then recounted of the time, nearly half a century ago, when, as a young and enthusiastic student, Hoffmann spent there many happy days. Not less interesting were his elaborated notes on the lectures and laboratory-work of that period, in many cases illustrated with handsome pen-sketches, which had been carefully preserved through all the wanderings of the intervening years, and in which he evinced a justifiable pride. It was evident that even at that early age the young apothecary had shown exceptional talent, and that he had pursued his studies with something more than ordinary zeal and diligence.

Having passed his State examination in pharmacy with the highest honors, and with a special inclination towards the sciences of botany and forestry, Hoffmann applied himself for a time to these studies, but, after having taken his degree at the University of Jena, in 1859, circumstances rendered it necessary for him to change his plans and return to pharmacy. Thus, after some years devoted to this pursuit in his native country, he left Germany in 1862, and established himself in the city of New York. In the metropolis of the New World, which was destined to be his home for a period of thirty-four years, Dr. Hoffmann's sound scientific training and literary abilities soon found recognition and appreciation. During the first four years of his residence in the United States he was engaged in teaching, and as an expert or adviser in connection with various chemical industries. For the next sixteen years he was engaged in the practice of pharmacy, although still finding time for a large amount of literary work. This found expression in several papers on the subjects of pharmaceutical education and legislation, and in a number of interesting biographical sketches, including those of some of his earlier teachers at the University of Berlin,

which were published chiefly in the *Popular Science Monthly*. He also issued, in 1872, a work entitled "A Manual of Chemical Analysis as Applied to the Examination of Medicinal Chemicals"; of this a third edition, in which the present writer collaborated, appeared in 1882. For two years, 1881-83, Hoffmann served as a chemical expert on the New York State Board of Health.

To the changes which time had effected in the practice of pharmacy, involving a departure from the conservative and strictly professional methods of the school in which he had been trained, Dr. Hoffmann could never become completely reconciled, and many of the duties which this pursuit entailed became to one of his temperament and culture increasingly onerous and uncongenial. For this reason he was induced in 1882 to dispose of his business and establish a new pharmaceutical periodical, which, under the title of the *Pharmaceutische Rundschau*, he conducted with marked ability and success for a period of thirteen years, and, in a somewhat altered form, it still continues to be issued as the *Pharmaceutical Review*. As the writer has stated on a previous occasion, when reviewing Dr. Hoffmann's service to pharmacy:

In the field of journalism he not only found a congenial occupation, but the resources of his mature and cultured mind, his broad scientific training, and his extended knowledge of practical affairs, together with his ability to form and express correct opinions regarding current problems and events, all served to impart to his writings a distinctive character and a literary value which will be appreciated and admired by all reflective students who peruse them for generations yet to come.

At the close of 1895 Dr. Hoffmann decided to discontinue his journalistic labors and seek rest and retirement in his native land; but it was contrary to his nature, and incompatible with a life of such intense activity, to remain for any length of time without some form of occupation. With the opportunities afforded him by the large libraries of the Continent he soon became engaged in historical researches, and, in collaboration with Dr. Gildemeister, of Leipzig, he produced the very comprehensive work on the essential oils, entitled "Die ætherischen Oele." This was issued in 1899, and may be regarded as a most worthy and crowning effort of his literary career.

On the occasion of the Jubilee of the American Pharmaceutical Association, which was celebrated at Philadelphia in the summer of 1902, Dr. Hoffmann was invited to deliver an address, and in re-

sponse to this request, he crossed the Atlantic, in order that he might once again meet the many friends who had conferred upon him this honor. Unfortunately, however, he was even then in such a feeble state of health as to render necessary his almost immediate return, thus compelling him to forego the long-anticipated pleasure of delivering his address in person, which was naturally a grievous disappointment, both to himself and to his friends. The subject he had selected for his discourse was "A Retrospect of the Development of American Pharmacy and the American Pharmaceutical Association," which was published in the "Proceedings" of the Association for 1902, and occupies forty-five closely printed pages. It would be needless here to refer to the thoroughness of its exposition and the charm of its diction.

The varied and exceptional attainments of Dr. Hoffmann and the service rendered by him in pursuit of the higher aims and ideals of pharmacy have been widely recognized, and he was the recipient of many distinctions, both in America and on the continent of Europe. Although in his sterner moods, and by his strong dislike of the superficial, as also by his determined and uncompromising views on many subjects, he was sometimes misunderstood or even harshly judged, yet those who were privileged to know him most intimately could not fail to have been impressed by his many noble qualities, by his generous nature, his kindness of heart, and by the encouragement and inspiration which he afforded those of younger years, to whom by his sympathies he was attracted.

In the attempt which has been made to delineate some of the more prominent features of a life so eventful as that which has now closed, the writer is fully conscious of the fact that the representation he has given is a very inadequate one; but the work and influence of the man will endure, however ephemeral and incomplete may be the tribute which friendship is permitted to bestow.

And such is human life; so gliding on;
It glimmers like a meteor, and is gone.

PHARMACEUTICAL MEETINGS.

JANUARY AND FEBRUARY.

The regular pharmaceutical meeting of the Philadelphia College of Pharmacy was held in the museum of the college on Tuesday

evening, January 10th, with W. L. Cliffe, member of the Pennsylvania Pharmaceutical Examining Board, in the chair. The meeting was a notable one in several particulars and will probably go down in history as one of the most important meetings of its kind ever held at the college, certainly in recent years.

The main topic chosen for consideration was that of the ethical relation of pharmacists and physicians, there being three addresses along this line.

Dr. Henry Beates, Jr., President of the State Board of Medical Examiners, was the first speaker and read a paper on "A Brief Consideration of a Few Facts Determining the Relationship between the Science and Art of Pharmacy and the Science and Art of Medicine." (See February number, page 51.)

Prof. John H. Musser, President of the American Medical Association, took for his theme the following: "A Tendency in Medicine and its Influence on Pharmacy." (See February issue, page 58.)

M. I. Wilbert, Ph.M., followed with a paper "On the Evident Need of a Profession of Pharmacy." (See February number, page 64.)

A number of physicians and pharmacists, both in Philadelphia and elsewhere, had been invited to take part in the discussion, and Prof. Henry Kraemer, Secretary of the Committee on Pharmaceutical Meetings, read letters from the following, regretting their inability either to be present or to send a communication: Dr. William Osler, Dr. J. C. Wilson, Dr. H. C. Wood, Dr. Oliver T. Osborne, Dr. H. A. Hare, Dr. James Tyson and Walter A. Rumsey.

The general discussion was participated in by the following: Dr. Beates, Warren H. Poley, Prof. Joseph P. Remington, Dr. Clayton M. Thrush, M. I. Wilbert and George M. Beringer. (See February number, page 70.)

Dr. Thrush said that he had had eight years experience as a pharmacist, and that he believed the prerequisite law for pharmacists should be enacted. Then referring to the shortcomings of physicians and pharmacists, he said that some pharmacists will substitute and that some physicians will order all of the new remedies that come out; sometimes they order only one prescription and the rest of the preparation is dead stock. He said that he had recently examined 1,000 prescriptions from leading stores of this city, and that only two of them were in the metric system, notwithstanding the fact that this system is taught both in schools of medicine

and schools of pharmacy. Another feature of these prescriptions was the frequent ordering of proprietary remedies.

Professor Remington spoke of the pre-requisite law now being considered by the Pennsylvania State Legislature and asked Dr. Beates to aid in securing its adoption. Dr. Thrush added that he believed that the pre-requisite law for pharmacists should be enacted and should receive the support of pharmacists and physicians.

Dr. P. N. K. Schwenk, an attending surgeon to Wills Eye Hospital, was the last speaker on the programme and read a paper on "The Size of the Dropper as Applied to Eye Drops Containing Alkaloids." (See page 123.)

Professor Remington said, in discussing this subject, that droppers are frequently used for other purposes than as eye-droppers. He said there was much difference in the size of drops, depending upon the kind of liquid used. He then referred to the dropper which also serves as a stopper and said that an attempt had been made to make this accurate. (See also page 125.)

Dr. Schwenk said that he favored sterilization, and that in preparing for operations on the eye he had his instruments sterilized each time. In preparing eye-drops he said it was his custom to boil the water and then add the alkaloid to the cooled liquid.

Mr. Poley spoke of a case of poisoning resulting from the use of a dropper that had been previously used.

On motion of Thomas H. Potts a unanimous vote of thanks was tendered the speakers of the evening.

The fifth of the present series of pharmaceutical meetings of the Philadelphia College of Pharmacy was held on Tuesday afternoon, February 14th, with Prof. Joseph P. Remington in the chair. The meeting was well attended, and partook of the nature of a symposium, the alcohol question being considered from various points of view.

Dr. H. W. Wiley, Chief of the Bureau of Chemistry, United States Department of Agriculture, gave an address on "Methyl Alcohol—what is it and what is it good for?" (See page 101.)

Prof. Samuel P. Sadtler read a paper in which he discussed "Methods for the Detection of Methyl Alcohol in Ethyl Alcohol." (See page 106.)

A paper by Mahlon N. Kline, Chairman of the Committee on

Legislation of the National Wholesale Druggists' Association, on "Some Reasons Why the Internal Revenue Tax on Alcohol Should be Reduced, and Why Our Government Should Provide Free Denaturized Alcohol for Use in the Arts," was read by Prof. Charles F. Parsons. (See page 111.)

Dr. A. R. L. Dohme, of Baltimore, sent a communication condemning the use of methyl alcohol for pharmaceutical purposes. He expressed the hope that Congress would grant the reduction in the tax on ethyl alcohol, and thus largely eliminate this excuse for the use of wood alcohol for any purpose connected in any way with medicine or pharmacy. (See page 119.)

The subject was further discussed by Dr. Henry W. Cattell (see page 121), Professor Sadtler, Dr. C. B. Lowe, Warren H. Poley and Dr. Wiley.

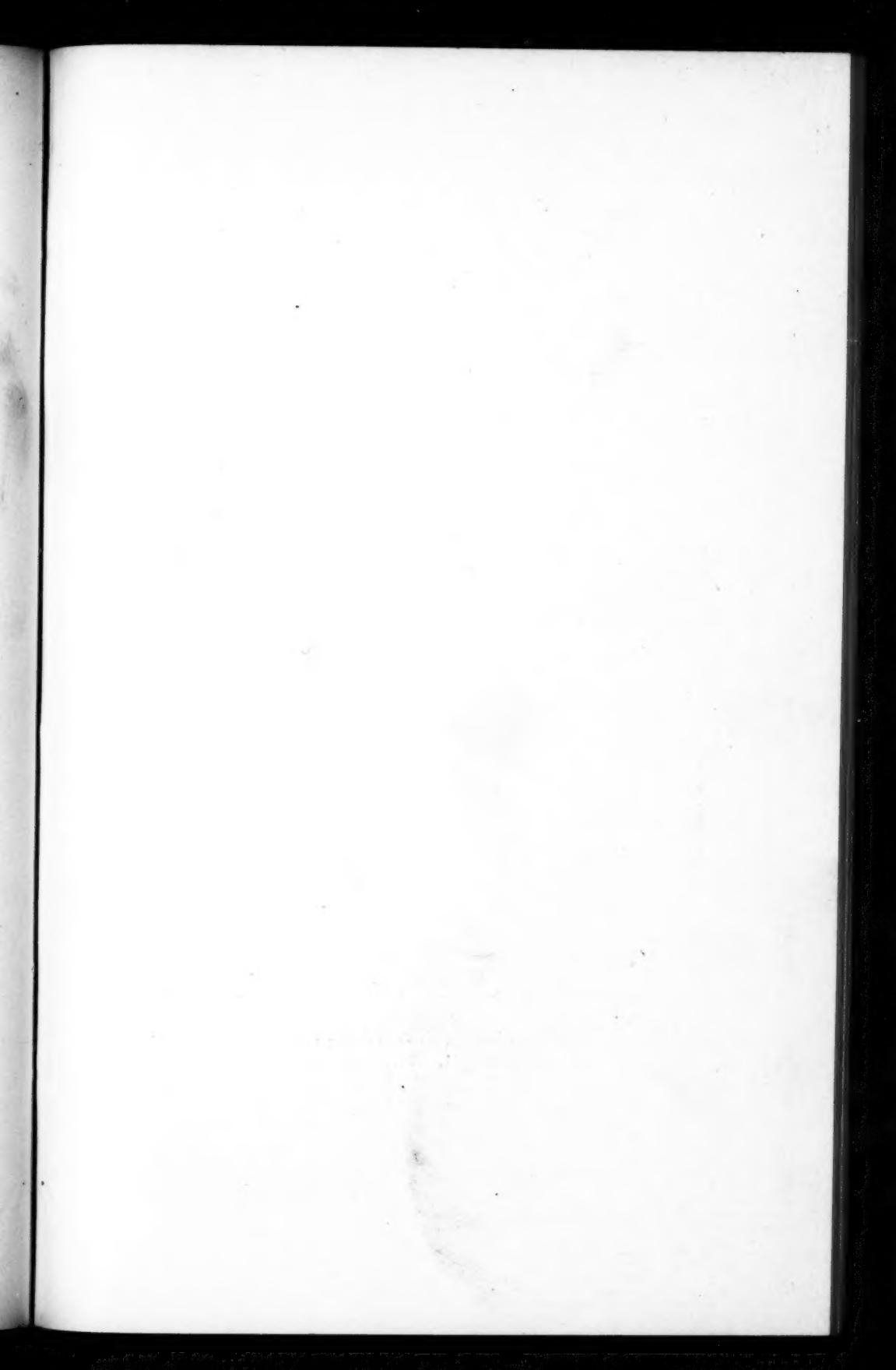
Mr. Poley said that milk which contained either formaldehyde or sodium borate or boric acid would not coagulate properly upon the addition of rennet, and he desired to know if this could be considered in the nature of a test for these substances. Dr. Wiley said that his experiments had not covered this point, but that he thought that any substance which prevented the action of ferments would interfere with the action of rennet, it being in the nature of a ferment.

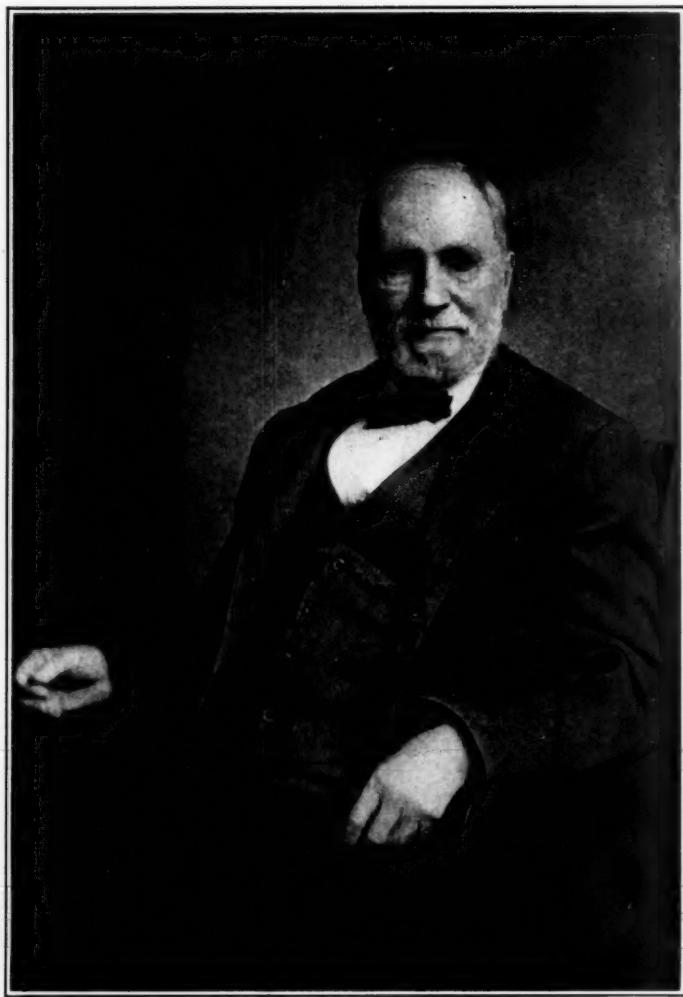
M. I. Wilbert read a paper on "Camphor Snow and Milk of Camphor," and exhibited samples of these preparations. (See page 128.)

Prof. C. Lewis Diehl, Louisville, Ky., was present, and was called upon for some remarks by the chairman. Mr. Boring said that the older members classed Professor Diehl with such men as Procter, Parrish and Maisch, and that he was a veteran of the civil war, and had been left on the battlefield at Stone River for dead, but that his life had been spared to assist in the development of American pharmacy.

The next meeting will be held on Tuesday evening, March 21st, when the subject of professional or scientific pharmacy will be considered. Papers will be read by Prof. Henry P. Hynson, of the University of Maryland; Dr. Wm. C. Alpers, New York City. George M. Beringer, Ph.M., will read a paper on "The Evolution of Nostrum Vending and its Relation to the Practice of Medicine and Pharmacy."

HENRY KRAEMER,
Secretary.





WILLIAM WEIGHTMAN,
1813-1904.